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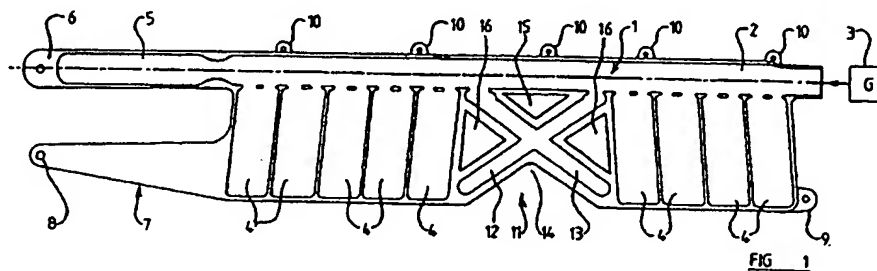
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US 5588672 A

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(54) Abstract Title
Improvements in or relating to an air-bag

(57) An air-bag for a motor vehicle, comprising an inflatable element(1) adapted to be mounted in position in or adjacent the roof of the vehicle extending along the side of the vehicle so that the inflatable element, when inflated, forms a curtain located between the occupant of the vehicle and the side of the vehicle, the inflatable element comprising a gas duct(2) extending axially of the element and a plurality of inflatable cells(4) extending transversely of the element, part of the inflatable element being formed by two intersecting chambers(12,13) which communicate with the gas flow duct which are of a substantially "X" configuration extending substantially from the gas flow duct to the lower edge of the inflatable element. The chambers(12,13) serve the function of applying tension to the lower edge of the inflatable element(1) as it is inflated.



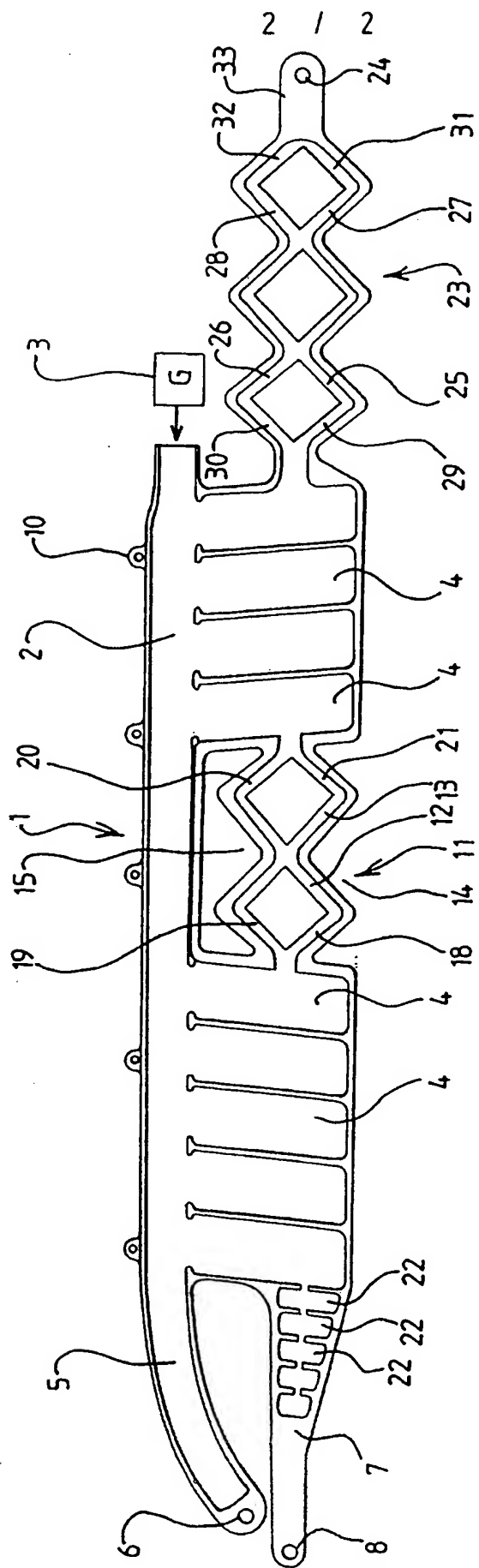


FIG 3

air-bag being pushed out through a window by the occupant during an accident.

It is to be appreciated that an air-bag of this type may be initially mounted in position in a motor vehicle in a non-linear housing or recess. The housing or recess may extend along the roof frame contour. Fixing points for the air-bag may be provided at opposed ends of the non-linear housing or recess, and the arrangement may be such that when the air-bag is inflated, the lower edge of the air-bag is to extend tightly in a linear fashion between these two fixing points. Thus, the air-bag must be longer, in the uninflated state, than the linear distance between the fixing points, since the distance within the housing or recess, along the roof contour, is longer than the straight-line distance between the fixing points. However, the air-bag must be designed so that the lower edge becomes tight and substantially rigid on inflation of the air-bag.

It is to be understood that an air-bag of this type must be inflated very swiftly, since the air-bag is intended to provide protection in the event of a side impact or roll-over. Inflation times of 10ms or less are appropriate and consequently it is desirable that the bag should be inflated by a minimum volume of gas. The greater the volume of gas which is needed to inflate the bag, the longer will be the inflation time, since the gas has to be moved physically from the gas generator to all the interior parts of the bag that expand as the bag is inflated.

The present invention seeks to provide an air-bag adapted to be readily stored in a non-linear housing or recess, but which can be inflated rapidly, using a minimum

Advantageously part of the fabric between the upper parts of the intersecting chamber is cut-away.

Conveniently part of the fabric on opposed sides of the intersecting chambers is cut-away.

The invention also relates to a motor vehicle provided with an air-bag arrangement, the air-bag arrangement comprising an air-bag as described above together with a gas generator adapted to inflate the air-bag.

In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a sectional side view of one embodiment of the invention when the air-bag is in a flat and unpacked state,

FIGURE 2 is a corresponding sectional side view of an alternative embodiment of the invention, and

FIGURE 3 is a further corresponding sectional side view of another alternative embodiment of the invention.

An air-bag arrangement embodying the present invention is intended to provide protection for a person sitting in a seat in a motor vehicle. It is envisaged that the invention will provide the greatest benefits in cars like multi-purpose vehicles or vans, or vehicles like mini-buses which have deep roof contours and low fixing points.

the inflatable element. The upper part of each cell 4 communicates, by means of an opening, with the duct 2, so that gas flowing through the duct 2 will inflate the cells 4.

The inflatable element is provided with means to mount the inflatable element in position. At the end of the gas duct 2 remote from the open end, there is an extension 5 of the inflatable duct that terminates with a fixing eye 6. Beneath the extension 5 of the duct 2, there is a fixation strap 7 extending from the lower-most edge of the part of the inflatable element defining the parallel cells 4, the strap 7 also terminating with a fixing eye 8. A further fixing eye 9 may be provided at the lower-most edge of the cell 4 closest to the open end of the gas duct 2 and further fixing eyes 10 may be provided at spaced positions along the gas duct 2. The inflatable element may be mounted in position by means of the fixing eyes. The fixing eyes will be secured to anchoring points provided on the body shell of the vehicle.

A central region of the inflatable element 11 is not provided with parallel cells 4, but instead is provided with two intersecting linear chambers 12,13 which intersect to form a "X", each chamber communicating, by means of an opening, with the gas flow duct 2. The chambers extend substantially from the gas duct 2 to the opposed, lower, edge of the inflatable element. At least a portion of the fabric forming inflatable element is cut-away in the area 14 defined between the intersecting chambers 12,13. A portion of the fabric may also be cut-away in the area 15 defined between the upper ends of the chambers, with further portions of fabric being cut-away in the areas 16 on either side of the intersecting chambers 12,13.

tension to the lower edge of the inflatable element as shown in Figure 1.

The combined effect of the shortening of the lower edge of the inflatable element by the expansion of the cylindrical cells and the effect of the inflation of the intersecting chambers 12,13 applies a tension to the lower edge of the inflatable element so that it becomes tensioned and substantially rigid.

It is to be appreciated that the region 14 of the inflatable element where the intersecting chambers are provided may be selected to be located immediately behind the "B"-Post of the motor vehicle so that inflated cells 4 are located adjacent the "B"-Post to prevent the head of an occupant inadvertently striking the "B"-Post. There is only a minimal risk of the head of an occupant striking the side of the vehicle at a position immediately behind the "B"-Post of the vehicle. The cells 12,13, together with the cells 4, will provide a substantial tensioning effect on the lower edge of the inflatable element. The cells 12,13 are only of a relatively low volume, consequently requiring a minimum volume of gas to secure their inflation.

Figure 2 illustrates a modified embodiment of the invention. A large proportion of the features of this embodiment are the same as those described with reference to Figure 1 and are identified by the same reference numerals and will not be re-described in detail here.

It is to be noted that in the embodiment of Figure 2, the intersecting chambers 12,13 are no longer located at a central position, but instead are located at one end of the inflatable element, between the end of the inflatable

At the right-hand side of Figure 3 a fixing strap 23 is illustrated, which extends from the lower edge of the cell 4 on the right-hand side of the inflatable element to a fixing eye 24. The strap comprises two interconnected pairs of intersecting chambers 25,26 and 27,28. The left-hand ends of the chambers 25,26 are connected to the right hand cell of the inflatable element 1 by ducts 29,30 respectively, and the right-hand ends of the chambers 27,28 are interconnected by ducts 31,32 respectively, the ducts 31,32 communicating with each other adjacent the end of a tab 33 that forms the terminal part of the strap 23 carrying the fixing eye 24. The fabric below and above the combination of the chambers and ducts that makes up the strap 23 as described above is cut-away.

When the strap is in the initial folded condition the intersecting chambers and the ducts that make up the strap will lie parallel with each other and the strap will have a corresponding length. On inflation of the inflatable element the chambers and ducts will inflate, and will occupy the position shown in Figure 3. When the strap is in this condition it will have a substantially shorter length, thus applying tension to the lower edge of the inflatable element.

The invention provides an inflatable element that can be stored within a non-linear recess or housing that extends, for example, along the roof line of a motor vehicle above the door (and window) openings in the side of the vehicle. The opposed ends of the recess or housing will be located at positions below the central part of the recess. The inflatable element, on inflation, will emerge from the recess or housing and comprise a substantially rigid curtain, with the lower edge extending directly

CLAIMS:

1. An air-bag for a motor vehicle, comprising an inflatable element adapted to be mounted in position in or adjacent the roof of the vehicle extending along the side of the vehicle so that the inflatable element, when inflated, forms a curtain located between the occupant of the vehicle and the side of the vehicle, the inflatable element comprising a gas duct extending axially of the element and a plurality of inflatable cells extending transversely of the element, part of the inflatable element being formed by two intersecting chambers which communicate with the gas flow duct and which are of a substantially "X" configuration extending adjacent the lower edge of the inflatable element or an extension thereof, material between the intersecting chambers at the lower edge being cut away.
2. An air-bag according to Claim 1, wherein the intersecting chambers are provided at a central region within the inflatable element.
3. An air-bag according to Claim 1, wherein the intersecting chambers are located adjacent one end of the inflatable element.
4. An air-bag according to any one of the preceding Claims wherein the intersecting chambers are formed in a strap forming an extension extending from the main part of the inflatable element to a fixing eye.
5. An air-bag according to any one of the preceding Claims, wherein the air-bag is made of two superimposed layers, the superimposed layers of fabric being interconnected by a one-piece weaving technique with the



Application No: GB 9714460.4
Claims searched: 1 to 8

Examiner: Karl Whitfield
Date of search: 26 September 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B7B (BSB)

Int Cl (Ed.6): B60R 21/16, 21/22

Other: Online database: Derwent World Patents Index accessed via Questel

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5588672 (KARLOW et al.) especially figure 5	

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.
E Patent document published on or after, but with priority date earlier than, the filing date of this application.